WHAT IS CLAIMED:

1. A fuel cell system comprising:

a housing defining an anode chamber and a cathode chamber and including a catalyst, a protonically conductive but electronically non-conductive membrane positioned between said anode chamber and said cathode chamber and a first vent in said anode chamber ;

a fuel chamber in gaseous communication with said anode chamber via a first valve;

a water chamber in gaseous communication with said anode chamber via a second valve; and

a mixing chamber having a second vent, wherein said mixing chamber is in gaseous communication with said anode chamber via a third valve, wherein

said mixing chamber receives fuel from said fuel chamber through a fuel valve, water from said water chamber via a water valve, and liquid effluent from said anode chamber via a liquid effluent valve, and

said mixing chamber provides a fuel mixture to said anode chamber via a fuel mixture valve.

2. The fuel cell system according to claim 1, wherein said water chamber is in communication with said cathode chamber via a cathode chamber valve.

3. The fuel cell system according to claim 1, wherein said first vent is operable to release pressure within said anode chamber.

4. The fuel cell system according to claim 1, wherein said first vent is operable to equalize pressure within said anode chamber with ambient pressure.

5. The fuel cell system according to claim 1, wherein said second vent is operable to

release pressure within said mixing chamber.

6. The fuel cell system according to claim 1, wherein said second vent is operable to equalize pressure within said mixing chamber with ambient pressure.

7. The fuel cell system according to claim 1, wherein at least one gas impermeable membrane is placed within a respective chamber to prevent said effluent gas from mixing with a liquid stored within said respective chamber.

8. The fuel cell system according to claim 1, wherein said fuel cell is a direct oxidation fuel cell.

9. The fuel cell system according to claims 1, wherein said fuel comprises a carbonaceous fuel.

10. The fuel cell system according to claim 9, wherein said fuel comprises methanol.

11. The fuel cell system according to claim 1, further comprising a controller.

12. The fuel cell system according to claim 1, wherein said controller includes a timer for tracking the amount of time said fuel cell generates electrical energy.

13. The fuel cell system according to claim 1, wherein said controller includes an electric meter for monitoring an amount of electricity produced by said fuel cell.

14. The fuel cell system according to claim 1, further comprising a diffusion layer provided in at least one of said anode chamber and said cathode chamber.

15. The fuel cell system according to claim 1, wherein said system is used in conjunction with a bipolar stack.

16. The fuel cell system according to claim 1, wherein said system is used in conjunction with a plurality of protonically conductive membranes.

17. The fuel cell system according to claim 16, wherein said plurality of protonically conductive membranes are assembled substantially in a single plane.

18. A method for moving a liquid between chambers of a fuel cell system comprising:

sealing off an anode chamber and a first chamber having a liquid stored therein of said fuel cell system from external pressure creating a closed sub-system;

allowing an effluent gas produced in said anode chamber to freely flow between said anode chamber and said first chamber;

storing a portion of said effluent gas in said first chamber, wherein a first pressure of said sub-system increases due to an increasing volume of said effluent gas being produced in said anode chamber;

sealing off said first chamber from said anode chamber, wherein said effluent gas substantially ceases to flow between said anode chamber and said first chamber;

creating a pressure differential between a second chamber and said first chamber by lowering a second pressure in said second chamber to a point below said first pressure;

opening a conduit between said first chamber and said second chamber, wherein as a result of said pressure differential, said liquid stored in said first chamber flows into said second chamber via said second conduit.

19. The method according to claim 18, wherein said first chamber is a mixing chamber, said liquid is a fuel mixture, and said second chamber is said anode chamber.

20. The method according to claim 18, wherein said first chamber is a liquid chamber, said liquid is water and said second chamber is a mixing chamber for mixing fuel and water to form a fuel mixture for supplying to said anode chamber.

21. The method according to claim 18, wherein said first chamber is a fuel chamber, said liquid is fuel and said second chamber is a mixing chamber for mixing fuel and water to form a fuel mixture for supplying to said anode chamber.

22. The method according to claim 18, wherein said first chamber is said anode chamber,

said liquid is liquid effluent and said second chamber is a mixing chamber for mixing fuel and water to form a fuel mixture for supplying to said anode chamber.

23. A method for agitating a liquid stored in a first chamber of a fuel cell system comprising:

sealing off said anode chamber from external pressure;

storing an effluent gas produced in said anode chamber within said anode chamber, wherein an anode pressure of said anode chamber increases over a period of time due to an increasing volume of said effluent gas being produced;

creating a pressure differential between said first chamber and said anode chamber by lowering a first pressure of a first chamber to a point below said anode pressure;

opening a conduit between said anode chamber and said first chamber, wherein as a result of said pressure differential, said effluent gas stored in said anode chamber flows into said first chamber agitating said liquid stored within said first chamber.

24. The method according to claim 23, wherein said first pressure is lowered by venting said first chamber to an environment having a lower pressure than said anode chamber.

25. The method according to claim 24, wherein said environment is an ambient air pressure.

26. In a fuel cell system comprising:

a housing defining an anode chamber and a cathode chamber and including a catalyst, a protonically conductive but electronically non-conductive membrane positioned between said anode chamber and said cathode chamber and a first vent;

a fuel chamber in gaseous communication with said anode chamber via a first valve;

a liquid chamber in communication with said anode chamber via a second valve; and

a mixing chamber having a second vent, said mixing chamber in communication with said anode chamber via a third valve, wherein

said mixing chamber receives fuel from said fuel chamber via a fuel valve, liquid from said liquid chamber via a liquid valve, and liquid effluent from said anode chamber via a liquid effluent valve, and

said mixing chamber provides a fuel mixture to said anode chamber via a fuel mixture valve,

a method for moving a fuel mixture stored within said mixing chamber to said anode chamber comprising:

closing said first vent, said second vent, said first valve, said second valve, said fuel valve, said fuel mixture valve, said liquid valve, and said liquid effluent valve, wherein a closed sub-system is established between said anode chamber and said mixing chamber;

opening said third valve allowing an effluent gas produced in said anode chamber to freely flow between said anode chamber and said mixing chamber;

storing a portion of said effluent gas produced in said anode chamber in said mixing chamber, wherein a volume of said effluent gas establishes a first pressure within said closed sub-system, said first pressure becoming increasingly higher as said effluent gas is produced;

closing said third valve to isolate said mixing chamber from said anode chamber;

opening said first vent to release said first pressure in said anode chamber such that a second pressure is established within said anode chamber lower than said first pressure creating a pressure differential between said mixing chamber and said anode chamber;

closing said first vent;

opening said fuel mixture valve and allowing said fuel mixture to flow from said mixing chamber into said anode chamber as a result of said pressure differential.

27. In a fuel cell system comprising:

a housing defining an anode chamber and a cathode chamber and including a catalyst, a protonically conductive but electronically non-conductive membrane positioned between said anode chamber and said cathode chamber and a first vent;

a fuel chamber in gaseous communication with said anode chamber via a first valve;

a water chamber in communication with said anode chamber via a second valve; and

a mixing chamber having a second vent, said mixing chamber in communication with said anode chamber via a third valve, wherein

said mixing chamber receives fuel from said fuel chamber via a fuel valve, water from said water chamber via a water valve, and liquid effluent from said anode chamber via a liquid effluent valve, and

said mixing chamber provides a fuel mixture to said anode chamber via a fuel mixture valve,

a method for moving liquid stored within said liquid chamber to said mixing

chamber comprising:

closing said first vent, said second vent, said first valve, said third valve, said fuel valve, said fuel mixture valve, said water valve, and said liquid effluent valve, wherein a closed sub-system is established between said anode chamber and said liquid chamber;

opening said second valve allowing an effluent gas produced in said anode chamber to freely flow between said anode chamber and said water chamber;

storing a portion of said effluent gas produced in said anode chamber in said water chamber, wherein a volume of said effluent gas establishes a first pressure within said closed sub-system, said first pressure becoming increasingly higher as said effluent gas is produced;

closing said second valve to isolate said water chamber from said anode chamber;

opening said second vent to lower a second pressure in said mixing chamber below said first pressure creating a pressure differential between said water chamber and said mixing chamber;

closing said second vent;

opening said water valve and allowing liquid to flow from said water chamber into said mixing chamber as a result of said pressure differential.

28. In a fuel cell system comprising:

a housing defining an anode chamber and a cathode chamber and including a catalyst, a protonically conductive membrane positioned between said anode chamber and said cathode chamber and a first vent;

a fuel chamber in gaseous communication with said anode chamber via a first

valve;

a water chamber in communication with said anode chamber via a second valve; and

a mixing chamber having a second vent, said mixing chamber in communication with said anode chamber via a third valve, wherein

said mixing chamber receives fuel from said fuel chamber via a fuel valve, water from said water chamber via a water valve, and liquid effluent from said anode chamber via a liquid effluent valve, and

said mixing chamber provides a fuel mixture to said anode chamber via a fuel mixture valve,

a method for moving fuel stored within said fuel chamber to said mixing chamber comprising:

closing said first vent, said second vent, said second valve, said third valve, said fuel valve, said fuel mixture valve, said water valve, and said liquid effluent valve, wherein a closed sub-system is established between said anode chamber and said water chamber;

opening said first valve allowing an effluent gas produced in said anode chamber to freely flow between said anode chamber and said fuel chamber;

storing a portion of said effluent gas produced in said anode chamber in said fuel chamber, wherein a volume of said effluent gas establishes a first pressure within said closed sub-system, said first pressure becoming increasingly higher as said effluent gas is produced;

closing said first valve to isolate said fuel chamber from said anode chamber;

opening said second vent to lower a second pressure below said first pressure creating a pressure differential between said fuel chamber and said mixing chamber;

closing said second vent;

opening said fuel valve and allowing fuel to flow from said fuel chamber into said mixing chamber as a result of said pressure differential.

29. In a fuel cell system comprising:

a housing defining an anode chamber and a cathode chamber and including a catalyst and a protonically conductive membrane positioned between said anode chamber and said cathode chamber, wherein said anode chamber includes a first vent;

a fuel chamber in gaseous communication with said anode chamber via a first valve;

a water chamber in communication with said anode chamber via a second valve; and

a mixing chamber having a second vent, said mixing chamber in communication with said anode chamber via a third valve, wherein

said mixing chamber receives fuel from said fuel chamber via a fuel valve, liquid from said liquid chamber via a liquid valve, and liquid effluent from said anode chamber via a liquid effluent valve, and

said mixing chamber provides a fuel mixture to said anode chamber via a fuel mixture valve,

a method for agitating a fuel mixture stored within said mixing chamber comprising:

closing said first vent, said second vent, said first valve, said second valve,

said third valve, said fuel valve, said fuel mixture valve, said water valve, and said liquid effluent valve, wherein a closed sub-system is established between said anode chamber and said water chamber;

storing an effluent gas produced in said anode chamber in said anode chamber, wherein a volume of said effluent gas establishes a first pressure within said anode chamber that becomes increasingly higher as said effluent gas is produced;

opening said second vent and said third valve allowing said stored effluent gas to flow from said anode chamber into said mixing chamber and out said second vent, wherein said fuel mixture stored in said mixing chamber is agitated as a result of said effluent gas flowing into said mixing chamber and out of said second vent as a result of said pressure differential.

30. A fuel cell system comprising:

a housing defining an anode chamber and a cathode chamber and including a catalyst and a protonically conductive but electronically non-conductive membrane positioned between said anode chamber and said cathode chamber, wherein said anode chamber includes a first vent;

a fuel chamber in gaseous communication with said anode chamber via a first valve;

a water chamber; and

a pump, wherein

said pump receives fuel from said fuel chamber via a fuel valve, water from said water chamber, and liquid effluent from said anode chamber, and

said pump provides a fuel mixture to said anode chamber.

31. In a fuel cell system comprising:

a housing defining an anode chamber and a cathode chamber and including a catalyst and a protonically conductive but electronically non-conductive membrane positioned between said anode chamber and said cathode chamber, wherein said anode chamber includes a vent;

a fuel chamber in gaseous communication with said anode chamber via a first valve;

a water chamber; and

a pump, wherein

said pump receives fuel from said fuel chamber via a fuel valve, water from said water chamber, and liquid effluent from said anode chamber, and

said pump provides a fuel mixture to said anode chamber.

a method for supplying fuel to said pump comprising:

closing said fuel valve;

opening said first valve allowing an effluent gas produced in said anode chamber to freely flow between said anode chamber and said fuel chamber establishing a closed sub-system between said anode chamber and said fuel chamber;

storing a portion of said effluent gas produced in said anode chamber in said fuel chamber, wherein a volume of said effluent gas establishes a first pressure within said closed sub-system, said first pressure becoming increasingly higher as said effluent gas is produced and wherein said first pressure is higher than a second pressure of said pump establishing a pressure differential there between;

closing said first valve to isolate said fuel chamber from said anode chamber;

opening said fuel valve and allowing fuel to flow from said fuel chamber into said pump as a result of said pressure differential.

32. In a fuel cell system comprising:

a housing defining an anode chamber and a cathode chamber and including a catalyst, a protonically conductive but electronically non-conductive membrane positioned between said anode chamber and said cathode chamber and a first vent;

a fuel chamber in gaseous communication with said anode chamber via a first valve;

a water chamber in communication with said anode chamber via a second valve; and

a mixing chamber having a second vent, said mixing chamber in communication with said anode chamber via a third valve, wherein

said mixing chamber receives fuel from said fuel chamber via a fuel valve, water from said water chamber via a liquid valve, and liquid effluent from said anode chamber via a liquid effluent valve, and

said mixing chamber provides a fuel mixture to said anode chamber via a fuel mixture conduit via a fuel mixture valve,

a method for moving liquid effluent from said anode chamber to said mixing chamber comprising:

closing said first vent, said second vent, said first valve, said second valve, said third valve, said fuel valve, said fuel mixture valve, said water valve, and said liquid effluent valve, wherein a closed sub-system is established

between said anode chamber and said mixing chamber;

storing an effluent gas produced in said anode chamber in said anode chamber, wherein a volume of said effluent gas establishes a first pressure within said anode chamber that becomes increasingly higher as said effluent gas is produced;

opening said second vent and said effluent valve allowing an effluent liquid stored in said anode chamber to flow from said anode chamber into said mixing chamber as a result of said pressure differential.

33. A fuel cell system comprising:

a housing defining an anode chamber and a cathode chamber and including a catalyst, a protonically conductive but electronically non-conductive membrane positioned between said anode chamber and said cathode chamber and a first vent;

a first conduit having a first end for receiving liquid effluent from said anode chamber and a second end for supplying a mixture of fuel and liquid effluent to said anode chamber; and

a fuel chamber in gaseous communication with said anode chamber via a first valve and in liquid communication with said first conduit via a fuel valve.

34. The fuel cell system according to claim 33, wherein a water chamber is in communication with said cathode chamber for receiving effluents generated therein.

35. A fuel cell system comprising:

a housing defining an anode chamber and a cathode chamber and including a catalyst, a protonically conductive but electronically non-conductive membrane positioned between said anode chamber and said cathode chamber and a vent;

a fuel chamber in gaseous communication with said anode chamber via a first

valve and in liquid communication with said anode chamber via a fuel valve.

36. In a fuel cell system comprising:

a housing defining an anode chamber and a cathode chamber and including a catalyst and a protonically conductive but electronically non-conductive membrane positioned between said anode chamber and said cathode chamber, wherein said anode chamber includes a vent;

a fuel chamber in gaseous communication with said anode chamber via a first valve and in liquid communication with said anode chamber via a fuel valve,

a method for supplying fuel to said anode chamber comprising:

closing said fuel valve;

opening said first valve allowing an effluent gas produced in said anode chamber to freely flow between said anode chamber and said fuel chamber establishing a closed sub-system between said anode chamber and said fuel chamber;

storing a portion of said effluent gas produced in said anode chamber in said fuel chamber, wherein a volume of said effluent gas establishes a first pressure within said closed sub-system, said first pressure becoming increasingly higher as said effluent gas is produced;

closing said first valve to isolate said fuel chamber from said anode chamber;

opening said vent to lower said first pressure to a second pressure creating a pressure differential between said fuel chamber and said anode chamber;

opening said fuel valve and allowing fuel to flow from said fuel chamber into said anode chamber as a result of said pressure differential.

37. A method for controlling a concentration of fuel in a fuel-water mixture for a direct

oxidation fuel cell system comprising:

determining a first concentration level of fuel in a fuel-water mixture within said direct oxidation fuel cell system;

comparing said first concentration level to a second required concentration level required for a particular operating condition, wherein

fuel is added to said fuel-water mixture when said first concentration level is less than said second required concentration level, and wherein

water is added to said fuel-water mixture when said first concentration level is higher than said second required concentration level.

38. A system for controlling a concentration of fuel in a fuel-water mixture for a direct oxidation fuel cell system comprising:

a housing defining an anode chamber and a cathode chamber, said housing also including a catalyst and a protonically conductive but electronically non-conductive membrane, wherein said anode includes a liquid-fuel mixture;

a fuel concentration sensor for determining a first concentration level of fuel in said fuel-water mixture;

a fuel chamber for storage of fuel, said fuel chamber in communication with said fuel-water mixture;

a water chamber for storage of liquid, said water chamber in communication with said fuel-water mixture; and

a controller for controlling a first flow of fuel to said fuel-water mixture, for controlling a second flow of liquid to said fuel-water mixture, and including a memory having a look-up table stored therein, said look-up table including operating condition data and associated fuel concentration levels.